MILITARY SPECIFICATION

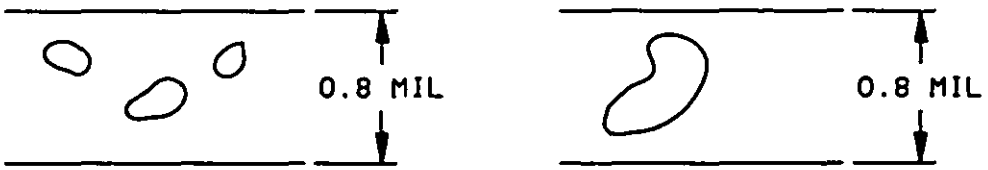
CAPACITORS, FIXED, CERAMIC DIELECTRIC,
(TEMPERATURE STABLE AND GENERAL PURPOSE), HIGH RELIABILITY
GENERAL SPECIFICATION FOR

This amendment forms a part of Military Specification MIL-C-123A, dated 10 August 1982, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 3

* 3.4.1, add the following:

"Dielectric thickness is the actual measured thickness of the dielectric layer; "voids" less than 50% of the total dielectric thickness shall not be considered.



Acceptable Unacceptable

PAGE 5

* 3.15, at end of sentence: Delete "(See appendix H)", as added in amendment 2.

PAGE 6

* 3.19, last sentence, delete and substitute: "For BP values below 20 pF, see table VA."

TABLE V, delete and substitute:

"TABLE V. Capacitance change with reference to +25°C.

Characteristic	Steps A through D of table XV Bias = 0 volts	Steps E through G of table XV Bias = rated voltage
BX	±15 percent	+15, -25 percent
BP 1/	0 ±30 ppm/°C	0 ±30 ppm/°C

1/ At the 25°C stability point, the capacitance measurement may be ±.1% or 0.05 pF, whichever is greater, from the 25°C reference."

* FIGURE 2, delete and substitute:

"TABLE VA. Temperature coefficient tolerances for BP values below 20 pF.

Permissible capacitance change from capacitance at +25°C in ppm/°C					
Temperature	Less than 2.1 pF	2.15 pF to 4.2 pF	4.3 pF to 8.0 pF	8.1 pF to 18 pF	Greater than 18 pF
+125°C	1/	±250 ppm/°C	±120 ppm/°C	±60 ppm/°C	±30 ppm/°C
-55°C 2/	1/	+246.25 -326.25	+116.25 -166.25	+55.00 -91.25	+27.50 -53.75

1/ Not practically measurable.
2/ The ppm/°C values for -55°C were calculated by dividing ppm by negative 80°C."

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* 3.20, Insulation resistance, delete and substitute:

"Insulation resistance: Humidity, steady state, 1.3 ±0.25 volts - Shall meet the initial 25°C requirement specified in 3.14. Moisture resistance, normal voltage - Not less than 50 percent of the initial 25°C requirement specified in 3.14."

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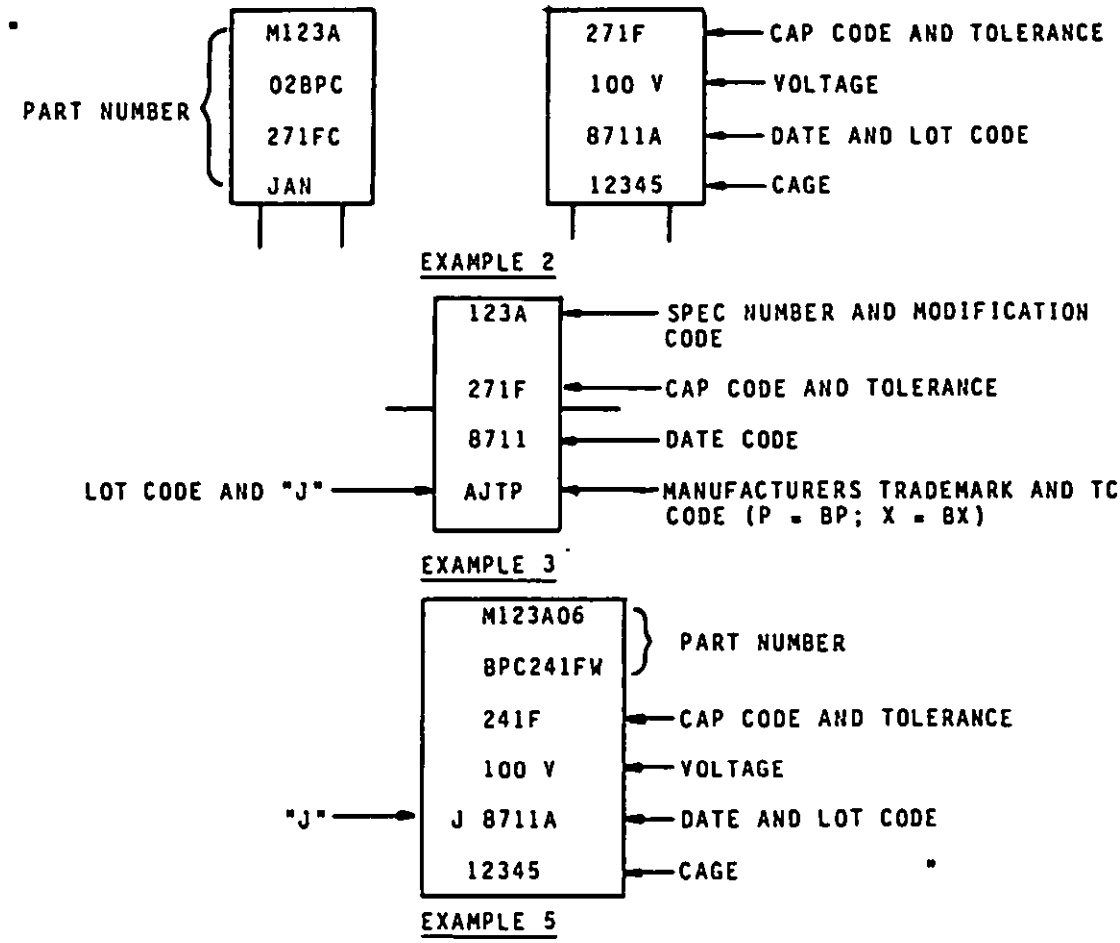
* Figure 3, examples 2, 3, and 5, delete and substitute:



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* After 4.1.1, add the following:

"4.1.2 Sample and data retention - all manufacturing lots. To facilitate failure analyses which may be required in cases of performance problems occurring in the service life of parts destined for use in long-term programs, the following samples and data relating to material, process, and product shall be retained by the vendor, and maintained in usable condition for fifteen years from the date of shipment of the parts.

"4.1.2.1 Material control documentation.

"4.1.2.1.1 Purchased raw materials. The following documentation for purchased raw materials shall be retained:

a. Procurement documentation - traceability.

b. Physical and chemical property data.

c. Performance evaluation/characterization data.

"4.1.2.1.2 In-house prepared materials. The following documentation for in-house prepared materials shall be retained:

a. Fabrication process control data.

b. Physical and chemical property data.

c. Performance evaluation/characterization data.

"4.1.2.2 Process control documentation. The following process control documentation shall be retained:

a. Lot travelers, including material traceability.

b. In-process nondestructive test results e.g., acoustic emission, NRI, X-ray film.

c. Process control - critical parameter data.

"4.1.2.3 In-process and finished product test samples and data. The following in-process and finished product test samples and data shall be retained:

a. In-process (preliminary) DPA samples and test report.

b. All manufacturing lots.

(1) Group A - Final DPA samples, electrical test samples, and test data.

(2) Group B - Test samples and test data.

c. Selected lots where group C testing is conducted - test samples and test data."

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* TABLE VII, Group I, Number of sample units to be inspected column: Delete "174 min" and substitute "198 min."

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4.5.2.2, delete and substitute:

"4.5.2.2 Group A inspection. Group A inspection shall consist of the tests and examinations specified in table IX. The following details shall apply:

a. Failure to meet destructive physical analysis (DPA) limits shall cause the lot to be rejected.

b. A summary of the results of group A inspection on each lot that meets requirements shall be submitted to the purchaser with the parts.

c. A copy of the applicable DPA report shall be submitted to the purchaser with each lot of parts."

TABLE IX, delete and substitute:

"TABLE IX. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Sample size	PDA
Subgroup 1				
Thermal shock and voltage conditioning 1/	3.10	4.6.6.1 & 4.6.6.2	100%	See table XIV
Voltage conditioning @ 85°C 2/	3.10	4.6.6.3	100%	XIV PDA overall req. only
Radiographic inspection (encapsulated capacitors only)	3.9	4.6.5	100%	N/A
Subgroup 2				
Visual and mechanical inspection; material, physical dimensions, design, construction, marking, and workmanship	3.1, 3.4, 3.24, and 3.25	4.6.3	.65 AQL	AQL level II
Subgroup 3				
Destructive physical analysis	3.15	4.6.11	See table XII	See table XII
Subgroup 4				
Body insulation (CKS26 only)	3.13	4.6.9.2	1.0 AQL 3/	AQL level II

1/ For solder coated nonleaded capacitor chips, thermal shock and voltage conditioning per 4.6.6.1 and 4.6.6.2 may be performed prior to addition of final metallization; and if performed, shall not be required during group A.
2/ Voltage conditioning at 65°C is only required for solder coated nonleaded capacitor chips that had voltage conditioning performed prior to final metallization.
3/ .65 AQL for CKS26 only."

PAGE 14

4.5.2.3: Delete last sentence.

* 4.5.3.2, last line: Delete "5 years" and substitute "15 years".

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4.6.3, line 3: Delete "appendix G" and substitute "3.25".

PAGE 16

* 4.6.5e, line 2: Delete "5 years" and substitute "15 years."

4.6.6.1, delete c and d and substitute:

"c. For group A testing: 20 cycles of thermal shock.
d. For group B testing: 100 cycles of thermal shock."

4.6.6.2, line 7: Delete "50" and substitute "48"; line 13, delete "4.6.9" and substitute "4.6.9.1".

4.6.6.3, delete and substitute:

"4.6.6.3 Voltage conditioning at 85°C for nonleaded solder coated chip capacitors (see 3.10). Voltage conditioning (see table IX) shall consist of applying twice the rated voltage to the units at 85°C for 48 hours. The voltage conditioning circuit and measurements of capacitance, dissipation factors, dielectric withstanding voltage and insulation resistance shall be the same as that described in 4.6.6.2."

* TABLE XIV, delete and substitute:

" TABLE XIV. Percent defectives allowable for subgroup 1, group A inspection.

Style	PDA last 48 hours following voltage conditioning at 125°C	PDA overall including voltage conditioning at 85°C
CKS05	1 unit or 0.1%	3%
CKS06	1 unit or 0.2%	5%
CKS07	1 unit or 0.2%	5%
CKS26	1 unit or 0.2%	5%
CKS11	1 unit or 0.1%	3%
CKS12	1 unit or 0.1%	3%
CKS14	1 unit or 0.1%	3%
CKS15	1 unit or 0.2%	5%
CKS16	1 unit or 0.2%	5%
CKS51	1 unit or 0.1%	3%
CKS52	1 unit or 0.1%	3%
CKS53	1 unit or 0.1%	3%
CKS54	1 unit or 0.1%	3%

"

PAGE 18

4.6.7(b): Delete and substitute "Voltage - a root-mean-square potential of 1.0 ±0.2 volt".

* 4.6.9.2a, delete first sentence and substitute:

"Points of application of test voltage - The encapsulated body of the capacitors shall be brought into intimate contact with a conductive material not less than 0.0625 inch and not more than 0.125 inch away from the lead wires."

PAGE 21

4.6.16.1a: Delete and substitute "a. Initial measurements - Capacitance".

4.6.16.1b, line 2: Delete "168 hours" and substitute "240 hours".

4.6.16.1b, line 3: Delete "1.5 volts maximum" and substitute "1.3 ±0.25 volts". Line 4, delete "100 kilohm resistor" and substitute "100,000 ohm resistance to each device under test".

* 4.6.16.1c, delete and substitute:

"c. Final measurements - Upon completion of above tests, remove capacitors from chamber and allow 3 1/2 ± 1/2 hours to dry and stabilize at 25°C before performing insulation resistance (IR) through a 100 kilohm resistor at 1.3± 0.25 volts, capacitance and dissipation factor in accordance with 4.6.7, 4.6.9, and 4.6.10."

4.6.16.2a: Delete and substitute "a. Initial measurements - Capacitance".

4.6.16.2f: Delete in its entirety.

PAGE 32

* C40.3c, delete and substitute:

"c. Chips shall be placed in identifiable rows on stiff plastic or glass trays. The tray must be level and perpendicular to the transducer head axis. The tray shall be checked after it is in the tank to assure that no air bubbles are trapped under the chips, or tray, or between the chips."

PAGE 44

F40. and F40.1: Delete in its entirety.

* F50.3, last line: Delete "3 years" and substitute "15 years".

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* Appendix H: Delete in its entirety, as added in amendment 2.

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

Custodians:
Air Force - 19
NASA - NA

Review activities:
Army - ER
Navy - EC
Air Force - 85
DLA - ES

Preparing activity:
NASA - NA

Agent:
DLA - ES

(Project 5910-1574)